0000 26496

RRES CONTROL
JTGOING LTR NO

ORDER# 47001-
4 RF 09546

DIST		
ARAL M E		
RLINGAME A H		
SBY W S		
ANCH D B		
RNIVAL G J		
VIS J G		
RRERA D W		
AY R E		
IS J A		
OVER W S		
DLAN P M		
NNI B J		
RMAN L K		
ALY T J		
DAHL T		
LBIG J G		
JTCHINS N M		
CKSON D T		
LL R E		
JESTER A W		
ARX G E		
cDONALD M M		
cKENNA F G		
ONTROSE J K		
ORGAN R V		
OTTER G L		
IZZUTO V M		
ISING T L		
ANDLIN N B		
CHWARTZ J K		
ETLOCK G H		
TEWART D L		
TIGER S G	X	
OBIN P M		
OORHEIS G M		
ILSON J M		
Peterman B D	X	X
Torre, A E	X	X
CORRES CONTROL	X	X
ADMN RECORD/080	X	X
TRAFFIC		
PATS/T130G		

CLASSIFICATION

UCNI		
UNCLASSIFIED		
CONFIDENTIAL		
SECRET		

AUTHORIZED CLASSIFIER
SIGNATURE
DATE

IN REPLY TO RFP CC NO
N/A

ACTION ITEM STATUS
PARTIAL/OPEN
CLOSED

LTR APPROVALS

ORIG & TYPIST INITIALS
AET CRW

EG&G ROCKY FLATS

EG&G ROCKY FLATS, INC
ROCKY FLATS PLANT, P O BOX 464, GOLDEN, COLORADO 80402-0464 • (303) 966-7000

September 14, 1994

94-RF-09546

Vern F Witherill
Acting Director for Decontamination
and Decommissioning Planning Division
DOE, RFFO

Attn W N Fitch

COMPLETION OF MILESTONE 130020344 - TRD-054-94

Action None Required

Enclosed is the draft Health and Safety Plan for Pilot Project Number Seven, Building 779, Rooms 152 and 154 Submission of this plan completes milestone 130020344 This plan was originally due on August 1, 1994 It has been delayed due to the lack of resources to develop the plan and due to the delay in finalization of the Sampling and Analysis Plan for this pilot project The Sampling and Analysis Plan has been submitted under separate cover

Should you have any questions, please contact Anthony Tome at extension 4072

A E Tome

T R De Mass, P E
Senior Program Manager
Decontamination and Decommissioning

AET crw

Orig and 1 cc - V F Witherill

Enclosure
As Stated

ADMIN RECORD
B779-A-00012

TASK-SPECIFIC HEALTH AND SAFETY PLAN
ENVIRONMENTAL RESTORATION PROGRAMS DIVISION

Phase I, D&D Pilot Project #7
Rocky Flats Environmental Technology Site
Building 779, Rooms 152 and 154

Revision 0, Draft A

September 1994

Task-Specific Health and Safety Plan
Environmental Restoration Programs Division
Phase I, D&D Pilot Project #7
Building 779, Rooms 152 and 154

TASK-SPECIFIC HEALTH AND SAFETY PLAN REVIEW AND APPROVAL

This Task-Specific Health and Safety Plan has been prepared according to applicable requirements and reflects the health and safety measures appropriate to the tasks to be performed and their associated hazards

Occupational Safety — Date

Industrial Hygiene — Date

Radiological Engineering — Date

Health and Safety Liaison Officer — Date

Environmental Restoration
Health and Safety Officer — Date

Project Manager — Date

1.0 GENERAL INFORMATION

This section provides a brief overview of the tasks covered by this health and safety plan, a description of the work site, and an identification of the health and safety responsibilities of project participants

1.1 Scope and Applicability to the Task-Specific Health and Safety Plan (HASP)

The purpose of this task-specific Health and Safety Plan (HASP) is to identify personal protection standards and mandatory safety practices and procedures for personnel involved in the decontamination and decommissioning (D&D) project This HASP is based on requirements for health and safety plan content established by the Occupational · Safety and Health Administration (OSHA) in Title 29 Code of Federal Regulations (CFR) 1910 120 This HASP is also based on requirements from the *Health and Safety Practices Manual*, the 5400 series of Department of Energy Orders, and 10 CFR 835 EG&G Rocky Flats implements these requirements for D&D activities in order to ensure a comprehensive health and safety program for both the project and the site personnel The task-specific HASP is intended to identify the applicable health and safety requirements for the Phase I activities associated with D&D Pilot Project #7 - Building 779, Rooms 152 and 154 *Initial Characterization Sampling and Analysis Plan - Building 779, Rooms 152 and 154* These activities will involve obtaining representative samples of the hazardous material and radiological contamination contained within Rooms 152 and 154 of Building 779 Phase II of the D&D Pilot Project #7 will involve the decontamination, as necessary, and removal of all gloveboxes, glovebox contents, equipment, instrumentation, shelves, and cabinets from Rooms 152 and 154 of Building 779

If the activities covered by this task-specific HASP are performed by a subcontractor, the subcontractor has the option to follow this HASP or to prepare a separate HASP If the subcontractor elects to prepare a separate HASP, it must at a minimum include requirements equivalent to this HASP If the subcontractor personnel will perform the radiological monitoring tasks, the subcontractor will follow the equivalent *Environmental Management Radiation Guidance Procedures*

1.2 Companion Documents

Health and Safety Practices (HSP) Manual, Volumes 1 and 2 (applicable chapters)

Initial Characterization Sampling and Analysis Plan - Building 779, Rooms 152 and 154, August 1994

Radiological Operating Instructions (ROI) Manual

Radiological Engineering Procedures (REP) Manual

Manual 1-94700-Traffic-120, *On-Site Transportation Manual*

EMD Operating Procedures Manual, Volume 1 Field Operations

Environmental Management Radiation Guidance Procedures

1.3 Visitors

Visitors entering the work area during the conduct of field activities will receive a briefing to this HASP In addition, visitors must have received General Employee Training, Respirator Indoctrination, and must wear a dosimeter, as required by the radiological work permit Visitors will not be performing hands on work activities

1.4 Site History and Description

Building 779 was placed into service in 1969 The building houses minor production and plutonium recovery operations, but is primarily a research and development facility Some metal parts were assembled in this building and bulk plutonium residues were recovered in the hydride operations The remainder of the operations conducted in Building 779 were research and development activities which included the following operations pyrochemical technology, coatings, plutonium and non-plutonium physical metallurgy, chemical technology in support of plutonium recovery operations in Building 771, and product physical chemistry The building also houses its own utilities, maintenance, custodial, and machine shop services as support for other operations Figure 1 shows the location of Building 779 at the Rocky Flats Environmental Technology Site (RFETS)

Rooms 152 and 154 are both 700 square foot laboratories located in the northwest area of the first floor of Building 779 Figure 2 shows the layout of both laboratory rooms

Room 152 housed Plutonium Physical Metallurgy which prepared and analyzed metallurgical samples The samples were comprised of plutonium, enriched uranium, and other metals contaminated with plutonium or enriched uranium

Room 154, also known as the Hydride Laboratory, housed a plutonium recovery process which used plutonium hydride and metal to recover plutonium from impure plutonium or plutonium-contaminated metals The process used a furnace, hydride reaction vessel, dehydride vessel, heat exchangers, and vacuum pumps

1.5 Identification of Health and Safety (H&S) Responsibilities

The following outlines the health and safety responsibilities of project participants

Project Manager and Field Manager A E Tome, X4072

- Responsible for the implementation of and compliance with the task-specific HASP
- Responsible for the implementation of and compliance with the *Initial Characterization Sampling and Analysis Plan - Building 779, Rooms 152 and 154*
- Maintain stop work authority if unsafe work conditions develop
- Re-initiate work activities after safe conditions have been restored with concurrence from Industrial Hygiene and Radiological Engineering

Environmental Restoration Health and Safety Officer K D Anderson, X6979

- Implement and manage health and safety for all Environmental Restoration (ER) funded projects and programs
- Provide integration and coordination of field support for all ER funded projects and programs
- Maintain stop work authority if unsafe work conditions develop

Radiological Operations (RO) Foreman W W Bailey, X5649

- Provide supervision of Radiological Control Technicians (RCTs) and implement requirements of the Radiological Work Permit (RWP)

Radiological Control Technician As assigned

- Provide radiological monitoring for personnel exposure hazards
- Ensure compliance to the RWP
- Ensure personnel sign in and out on the RWP

- Ensure appropriate actions are taken in response to radiological emergencies or contamination events
- Maintain stop work authority if unsafe work conditions develop

Radiological Engineering R W Norton, X4075

- Define the engineering, administrative, and work activity controls for identified radiological hazards
- Define personal protective equipment (PPE) requirements for radiological hazards
- Define requirements for the release of property or materials according to HSP 18 10
- Maintain stop work authority if unsafe work conditions develop

Industrial Hygiene M D Schreckengast, X6790

- Define the engineering, administrative, and work activity controls for identified chemical and physical hazards
- Define and provide air/exposure monitoring of identified chemical and physical hazards
- Define PPE requirements for identified chemical and physical hazards
- Maintain stop work authority if unsafe work conditions develop

Occupational Safety W D Harlow, X4165

- Anticipate, recognize, and evaluate safety hazards, recommend control measures as necessary
- Perform inspections and ensure compliance with applicable standards/procedures

Sample Management Office (SMO) J R Dick, X5217

- Comply with the requirements stipulated in the task-specific HASP and the RWP

- Obtain samples in accordance with the *Initial Characterization Sampling and Analysis Plan - Building 779, Rooms 152 and 154*

- Package and ship samples in accordance with the On-site Transportation Manual

Site Workers

- Comply with the task-specific HASP and applicable RFETS practices and policies

1.6 Task Description and Project Summary

Activities to be conducted under Phase I of D&D Pilot Project #7 will be controlled by the Project Manager and the Field Manager The following activities will be performed

1) Pre-job survey for potential radiological contamination and general area dose rate,

2) Collection of hazardous material swipe, liquid, and rinseate samples from interior surfaces and selected equipment surfaces in Rooms 152 and 154,

3) Radiological characterization (i e , direct alpha and beta/gamma readings and smears) of interior surfaces of Rooms 152 and 154, and

4) Packaging and shipping the samples to an on-site laboratory or off-site vendor for analysis

The number and location of sample/survey points are outlined in the *Initial Characterization Sampling and Analysis Plan - Building 779, Rooms 152 and 154* The analyses to be performed on the samples are also described in this document

Areas beneath Building 779 are addressed by the Interagency Agreement and Under Building Contamination - Building 779 No intrusive activities (e g , excavation, drilling, soil sampling) in these under building areas will be performed on this project

If unknown or unsuspected chemical and/or radiological contaminants are encountered, a stop work order will be issued by the Field Manager, the RO Foreman, the Radiological Engineer, the Environmental Restoration Health and Safety Officer, and/or the Industrial Hygienist, as appropriate Work will not resume until an appropriate resolution and engineering, administrative, and/or PPE requirements have been agreed upon by the Project Manager, Radiological Engineering, and Industrial Hygiene, as appropriate, and implemented Work

involving contaminated equipment or chemicals will be controlled by the applicable RFETS policies, practices, or procedures

2 0 HEALTH AND SAFETY HAZARD ASSESSMENT

This section assesses the anticipated radiological, chemical, and physical hazards associated with the field activities

2.1 Task Analysis

Table 1 lists and assesses the task to be performed

2.2 Hazard Analysis

The following three subsections describe the radiological, chemical, and physical hazards anticipated to be present during the sampling and characterization activities

2.2.1 Radiological Hazards

Based on the historical use of Rooms 152 and 154, it is anticipated that plutonium 239, 240, and 241, americium 241, and uranium 234, 235, and 238 contamination will be present on the interior surfaces of the two rooms and on selected pieces of equipment located inside the two rooms To ensure that radiological conditions are consistent with the specified RWP requirements, a pre-job contamination survey will be conduced by the RCT prior to the initiation of the field sampling and characterization activities This survey will be conducted and documented according to ROI 3 1, *Performance of Surface Contamination Surveys* In addition, the general area dose rates will be monitored according to ROI 1 1, *Radiation Surveys* The collection of smear samples for the radiological characterization of the gloveboxes in Rooms 152 and 154 will be performed in accordance with ROI 3 9, *Performance of Glovebox Contamination Surveys*

Radiation dose rates in the area are projected to be very low The primary radiological hazard will be associated with the inadvertent intake of the low concentrations of radioactive material present on the building and equipment surfaces Table 2 lists the exposure limit, hazards type, physical characteristics, routes of exposure, and chronic exposure symptoms for americium, plutonium and uranium

2.2.2 Chemical Hazards

Based on site records and the historical use of Rooms 152 and 154, a variety of non-radiological

TABLE 1
TASK INVENTORY AND ASSESSMENT

Task #	Task Title	Directing Document	Task Description	Task Steps
1	Pre-job Survey	*Radiological Operating Instructions (ROI) Manual*	Perform pre-job survey	1 Performance check on instrumentation 2 Don personal protective equipment (PPE), as required by the RWP 3 Perform contamination and radiation exposure surveys per ROI 4 Perform decontamination, as appropriate
2	Field Sampling	*Initial Characterization Sampling and Analysis Plan - Building 779, Rooms 152 and 154*	Collect hazardous material swipe, liquid, and rinseate samples from interior and equipment surfaces in Rooms 152 and 154	1 Don PPE, as required by the RWP 2 Obtain samples/smears 3 Perform decontamination, as appropriate
3	Field Radiological Characterization Survey	*Initial Characterization Sampling and Analysis Plan - Building 779, Rooms 152 and 154*	Perform radiological characterization survey of interior surfaces in Rooms 152 and 154	1 Don PPE, as required by the RWP 2 Conduct survey and collect samples for analysis 3 Perform decontamination, as appropriate
4	Sample Packaging and Shipping	*On-Site Transportation Manual*, Section 5 0, Instructions	Package and ship samples to on-site laboratory or off-site vendor for analysis	1 Package samples according to the *Initial Characterization Sampling and Analysis Plan* and the *On-Site Transportation Manual*, Section 5 0, Instructions 2 Ship samples according to the *Initial Characterization Sampling and Analysis Plan* and the *On-Site Transportation Manual*, Section 5 0, Instructions

TABLE 2
RADIOLOGICAL & CHEMICAL HAZARDS POSED BY SITE CONTAMINANTS AND ROUTES OF EXPOSURE

Tasks Involving Contaminants (Tasks Defined in Table 1)	Maximum Expected Concentration	Contaminant (Synonym)	DOE DAC, OSHA PEL or ACGIH TLV (IDLH)*	Hazard Type	Physical Characteristics	Routes of Exposure	Chronic Exposure Symptoms (Target Organs)
Tasks 1 2 and 3	Unknown	Americium 241	2E 12μCi/ml (from 10 CFR 835)	Carcinogen Toxic	Green brown-gray dust	Inhalation, Ingestion, Injection	Biological damage associated with cancer - chronic exposure (lungs liver, bones)
Tasks 1 2 and 3	Unknown	Plutonium 239 240 and 241	2E 12μCu/ml(Pu-239/240) 1E 10μi/ml (Pu 241) (from 10 CFR 835)	Carcinogen Toxic	Green-brown-gray dust	Inhalation Ingestion Injection	Biological damage associated with cancer - chronic exposure (bones liver lungs)
Tasks 1, 2, and 3	Unknown	Uranium 234 235 and 238	2x10 $^{11}\mu$Ci/ml (from 10 CFR 835)	Carcinogen Toxic	Silver white, malleable ductile lustrous solid	Inhalation Ingestion Injection	Biological damage associated with cancer - chronic exposure (liver kidneys)
Tasks 1, 2 and 3	Unknown	Beryllium	0 002 mg/m^3 (10 mg/m^3)	Carcinogen Toxic	Brittle gray-white solid	Inhalation, Ingestion	Weakness, and fatigue (lungs, skin, eyes)
Tasks 1 2, and 3	Unknown	Nitric acid	2 ppm (100 ppm)	Corrosive	Colorless yellow or red fuming liquid with an acrid suffocating odor	Inhalation Ingestion, Skin and/or eye contact	Irritated eyes and skin (eyes, respiratory system skin)
Tasks 1, 2, and 3	Unknown	Polychlorinated biphenyl (Aroclor™ 1254)	0 50 mg/m^3 (5 mg/m^3)	Carcinogen	Colorless to pale yellow viscous liquid or solid with a mild hydrocarbon odor	Inhalation, Absorption Ingestion, Skin and/or eye contact	Irritated eyes and skin (skin, eyes liver)
Tasks 1 2 and 3	Unknown	Argon and nitrogen	None	Asphyxiant	Colorless odorless gases	Inhalation	Asphyxiation acute symptom (respiratory system)
Tasks 1, 2 and 3	Unknown	Fluorotrichloro methane (Freon™ 11)	1 000 ppm (10 000 ppm)	Toxic	Colorless nearly odorless liquid or gas (above 75°F)	Inhalation Ingestion Skin and/or eye contact	Dermatitis, incoherence (central nervous system, skin)

* Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) Immediately Dangerous to Life or Health (IDLH) concentration The most conservative value is shown for the PEL, TLV or Derived Air Concentration (10 CFR 835)

chemicals may be present in the interior of the rooms and on equipment surfaces to be sampled Of note is the presence of argon and nitrogen gas in cylinders in both laboratory rooms A mixture of these two gases was used to create an inert atmosphere inside the gloveboxs Chemical contaminants of concern are listed in Table 2, along with the exposure limits, hazard type, physical characteristics, routes of exposure, and chronic exposure symptoms It is expected that the chemicals listed in Table 2, if present, will be present in trace quantities

2.2.3 Physical Hazards

In addition to the anticipated radiological and chemical hazards in Rooms 152 and 154 of Building 779, some physical hazards or hazardous conditions are also anticipated to be present during the sampling and characterization activities These physical hazards consist of heat stress, slipping, tripping, or falling, fire, and, energized equipment The physical hazard of greatest concern is fire which is associated with the collection of smear samples of plutonium hydride from the interior surfaces of the gloveboxes Because of the pyrophoric nature of plutonium hydride, these smears may spontaneously combust, if exposed to a fully oxygenated atmosphere The physical hazards associated with the sampling and characterization activities are summarized in Table 3, along with the control measures

3 0 HEALTH AND SAFETY HAZARD CONTROL

This section identifies the personal protective equipment (PPE) to be worn during the field efforts and the radiological, chemical, and physical hazards monitoring and controls to be used during the field activities

3 1 Personal Protective Equipment

Workers will be trained in the use, maintenance, limitations (including breakthrough time), and disposal of PPE assigned to them in accordance with federal OSHA regulations in 29 CFR 1910 132 At a minimum, workers entering the Building 779 exclusion zone for Task 1 will be required to wear the following PPE

- Safety shoes,
- Company provided long sleeve coveralls,
- ANSI Z87 1 Class 1 eye protection, and
- Appropriate work gloves, as specified on the RWP

Table 3
Physical Hazard Identification and Control Measures

Physical Hazard	HSP Section	Control Measures
Heat Stress	N/A	• Provide adequate fluids • Follow heat stress guidelines attached in Appendix A • Wear appropriate protective clothing
Fire from pyrophoric plutonium in gloveboxes	HSP 32 04 HSP 33 04 HSP 34 07	• Prior to field activities, establish a clear plan for response in the event of a fire during sampling activities • Follow procedures for glovebox bag in/bag out activities
Energized equipment	HSP 2 08	• Prior to field activities, contact the Lock Out/Tag Out Manager and verify that equipment to be sampled/characterized in Rooms 152 and 154 has been de-energized
Slip, Trip, Fall	HSP 10 01 HSP 22 05	• Identify and mark physical hazards • Use fall protection when working at heights above 6 feet

At a minimum, workers entering the Building 779 exclusion zone for Tasks 2 and 3 will be required to wear the following PPE

- Safety shoes,
- Company provided long sleeve coveralls,
- Company provided Tyvek® or white cotton coveralls,
- Full-face respirator with HEPA filter cartridges (during sampling activities only), and
- Two pairs of surgical gloves

PPE is to be donned prior to entering the designated work site and is to be inspected by the worker prior to its use It is to be removed according to the personal radiological monitoring requirements as specified on the RWP

3.2 Monitoring

The following three subsections describe the radiological, chemical, and physical monitoring and controls to be used during the conduct of field activities

3.2.1 Radiological Monitoring

Monitoring for radiological exposure hazards will be conducted by the RCTs according to the RWP, *ROI Manual*, and *Health and Safety Practices Manual* Radiological surveillance date and time, survey recordkeeping requirements, radiation instrumentation performance checks and calibration requirements are detailed in the ROI Manual, and the Radiological Engineering Procedures Manual Selective Alpha Air Monitors (SAAMs) are located in both Room 152 and 154 Criticality alarms are located in Building 779 In the event that a SAAM or criticality alarm sounds, all personnel are to follow the requirements of HSP 18 15, *Emergency Alarms and Response* and assemble in a safe area that is designated by the RCT

Equipment and material released from the area which is controlled for radiological concerns and all samples that are packaged and shipped shall be surveyed according to Procedure 4-61300-RO1-03 02, *Survey Requirements for Conditional and Unrestricted Use,* and meet the release requirements of Procedure 1-16100-HSP-18 10, *Release of Property/Waste for Conditional and Unrestricted Use*

3 2.2 Chemical Monitoring

Ambient air monitoring of organic vapors and airborne particulate concentrations will be performed by EG&G Industrial Hygiene to determine the need for upgrading or downgrading respiratory protection levels and to detect elevations in air contaminant levels that may result in the need for additional air sampling The *Health and Safety Practices Manual* (Chapter 13) will be followed where applicable, based on these air monitoring results Concentrations of volatile organic compounds in the immediate breathing zone of working personnel will be monitored with a photoionization detector Airborne particulate concentrations (e g , dust) will be monitored by a real-time aerosol monitor (e g , MIE Miniram) Action levels will be based on recommendations from Industrial Hygiene Because of the presence of inert gases (e g , argon) and pyrophoric plutonium in Rooms 152 and 154, the existing oxygen analyzer in Room 154 will be used to detect the presence of an oxygen-deficient or oxygen-rich atmosphere in the work areas

3 2.3 Physical Hazards Control

Measures to control physical hazards during the sampling and characterization activities are identified in Table 3 As was noted in Section 2 2 3, fire is the physical hazard of greatest concern on this project In order to prevent a fire during the sample collection process, special glovebox bag in/bag out and sample handling procedures (Procedure 1-82500-HSP-31 11) will be utilized by the workers In the event of a fire, special material (e g , magnesium oxide) must be used to extinguish a fire which involves pyrophoric plutonium

4.0 TRAINING REQUIREMENTS

HSP 21 03 specifies Hazardous Waste Operations and Emergency Response training requirements for hazardous waste activities The following training shall be required for this task

- 40-hour Health and Safety Hazardous Waste Site Worker Training
- Radiation Worker Level II
- General Employee Training
- Respirator Indoctrination and Respirator Fit Test (RCTs and SMO)
- Building evacuation procedures
- Fire control and response procedures
- Building access requirements
- Personal protective equipment use

In the event that the work environment changes, the training requirements will be re-evaluated by Industrial Hygiene and Radiological Engineering

All personnel will receive a site briefing to the task-specific HASP and the On-Site Transportation Manual Documentation of this briefing as well as all training will be maintained in accordance with the *Training User's Manual*

4.1 Tailgate Safety Meetings

A "tailgate" or "toolbox" safety briefing will be conducted as part of the pre-work briefing that will be held as part of the activity The briefing will address hazards relevant to Phase I of the D&D Pilot Project Additional safety briefings will be conducted as needed

5 0 MEDICAL SURVEILLANCE REQUIREMENTS

All working personnel must comply with and participate in a Medical Monitoring Program as stipulated in HSP 4 00, Medical Program, Chapters 4 02 through 4 17

6.0 SITE CONTROL MEASURES

This section describes the measures to be used to control the work site and to operate in a safe manner

6.1 Site Map

Figure 1 shows the location of the Building 779 work site within the RFETS complex This Figure also identifies the location of the on-site medical facility

6.2 Buddy System

All personnel will follow the requirements of the "buddy system" as defined by 29 CFR 1910 120

6.3 Work Zones

Per the requirements of 29 CFR 1910 120, an exclusion zone (EZ) or Radiologically Controlled Area (RCA) will be established around the areas of contamination within Rooms 152 and 154 of Building 779 Access to the EZ or RCA will be restricted to trained and qualified personnel who require access to perform the sampling and characterization activities or other building support activities The establishment of an exclusion zone for radiological concerns will be or has been determined by the RO Foreman and Radiological Engineer according to HSP 18 08, *Use of Step-Off Pads and H&S Barriers in Radiologically Controlled Areas* The requirements for entry to the EZ will be defined on the RWP

A support zone (SZ) and contamination reduction zone (CRZ) or the equivalent RCA step-off pads (HSP 18 02, 18 08, and 18 09) will be established immediately adjacent to that exclusion zone These areas will be used to support work activities/personnel and maintain radiological and hazardous material control of the work area

6 4 Site Communications

Personnel will maintain visual contact with other site personnel while working in the exclusion, support, and contamination reduction zones

6.5 Medical Assistance

Emergency Medical Assistance is available by calling extension 2911 on any plant telephone Individuals requiring emergency medical assistance shall be transported to the on-site medical facility (Building 122) per the direction from the Emergency Medical Response Personnel The location of the on-site medical facility is shown on Figure 1 Per HSP 3 03, all personnel injuries or illnesses must be reported to the Project Manager

7.0 DECONTAMINATION PLAN

Personnel shall be monitored by the RCT according to the requirements detailed in the RWP, if appropriate As a minimum, the RCT shall perform a whole body frisk for alpha and beta/gamma radiation as personnel leave the RCA

In addition to the *Environmental Operational Procedures* and the *Waste Solidification Procedures*, personnel and equipment decontamination and the handling of decontamination solutions shall be conducted according to the following

- HSP 18 12, *Radioactive Contamination Control and Decontamination*
- HSP 18 03, *Radiological Protection Signs, Labels, and Tags*
- HSP 18 10, *Release of Property/Waste for Conditional and Unrestricted Use*
- 5-21000-OPS-FO 03, *General Equipment Decontamination*
- ROI 1 1, *Radiation Surveys*
- ROI 2 1, *Personnel Contamination Monitoring*
- ROI 3 1, *Performance of Surface Contamination Surveys*
- 4-61300-ROI-03 02, *Survey Requirements for Conditional and Unrestricted Use*
- 4-61300-ROI-03 05, *Handling of Contaminated Personnel Dosimeters and Security Badges*
- ROI 3 6, *Laundry Monitoring*

Prior to leaving Building 779, personnel shall be required to shower following the completion of the sampling and characterization tasks

8.0 EMERGENCY RESPONSE

In the event of an emergency, personnel performing the tasks shall obtain emergency assistance by notifying the Foreman and/or by calling X2911 There are also fire alarms in Rooms 152 and 154 that can be activated in an emergency The fire alarm must be activated in the event of any fire

Life threatening emergencies - Notify Shift Supervisor or call X2911 This notification will provide access to the Plant Protection Central Alarm Station, Fire Department, and Occupational Health

Non-life threatening emergencies - Notify Supervision, EG&G Project Manager, and the Field Manager

8.1 Spill Response and Control Procedures

The following procedures will be adhered to for the purpose of this project

Procedure 1-62200-HSP-21 04, *Emergency Response and Spill Control*
Procedure 1-C49-HWRM-04, Rev 0, *Release Response and Reporting*

8 2 Evacuation Plan

In the event of an emergency, evacuate the EZ/CRZ and assemble in a safe area as designated by the RCT All personnel will comply with the requirements of HSP 18 15, *Emergency Alarms and Response*

8.3 Emergency Equipment

PPE must be kept in reserve and maintained for emergency use This equipment may be from the same stock that is used for daily operation, provided that a portion is readily available for emergency use The follow equipment will be kept at the field location

- First aid kit,
- Fire extinguisher and magnesium oxide,
- Reserve PPE,
- Emergency decontamination equipment (Kim wipes),
- Full-face respirator (for unknown/unsuspected chemical/radiological contamination), and
- Surgical gloves

9.0 HASP BRIEFING AND POTENTIAL AMENDMENTS

This task-specific HASP addresses the health and safety aspects of the work related to the sampling and characterization activities in Rooms 152 and 154 of Building 779 Personnel who perform the tasks described in Section 1 6 must be briefed on the contents of this task-specific HASP and documentation of the briefing must be maintained per the *Training User's Manual*

This HASP is based on information available at the time of preparation Unexpected conditions may arise which will require reassessment of this HASP Unplanned activities and/or changes in the hazard status may require a review of, and may result in changes to, this HASP Changes in the anticipated hazard status or unplanned activities are to be recorded as an amendment to this plan Amendments must be approved by the Project Manager with concurrence by Industrial Hygiene and Radiological Engineering

Appendix A
Heat Stress Monitoring Strategy

Heat Stress and Other Physiological Factors

Wearing PPE puts a hazardous waste worker at considerable risk of developing heat stress This can result in health effects ranging from transient heat fatigue to serious illness or death Heat stress is caused by a number of interacting factors including environmental conditions, clothing, workload, and the individual characteristics of the worker Because heat stress is probably one of the most common (and potentially serious) illnesses at haz ardous waste sites, regular monitoring and other preventive precautions are vital

Individuals vary in their susceptibility to heat stress Factors that may predispose someone to heat stress include

- Lack of physical fitness
- Lack of acclimatization
- Age.
- Dehydration
- Obesity
- Alcohol and drug use.
- Infection
- Sunburn
- Diarrhea
- Chronic disease.

Reduced work tolerance and the increased risk of excessive heat stress is directly influenced by the amount and type of PPE worn PPE adds weight and bulk, severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection and radiation), and increases energy expenditure. Therefore when selecting PPE each item's benefit should be carefully evaluated in relation to its potential for increasing tne risk of heat stress Once PPE is selected the safe duration of work/rest periods should be determined based on the

- Anticipated work rate.
- Ambient temperature and other environmental factors
- Type of protective ensemble.
- Individual worker characteristics and fitness

Monitoring

Because the incidence of heat stress depends on a variety of factors all workers even those not wearing protective equipment should be monitored

- For workers wearing permeable clothing (e.g , standard cotton or synthetic work clothes) follow recommendations for monitoring requirements and suggested work/rest schedules in the current American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values for Heat Stress [11] If the actual clothing worn differs from the ACGIH standard ensemble in insulation value and/or wind and vapor permeability change the monitoring requirements and work/rest schedules accordingly [12]

Source

NIOSH/OSHA/USCG/EPA Occupational Safety And Health Guidance Manual for Hazardous Waste Site Activities, October 1985

- For workers wearing semipermeable or impermeable[1] encapsulating ensembles the ACGIH standard cannot be used For these situations workers should be monitored when the temperature in the work area is above 70°F (21°C) [6]

To monitor the worker measure

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period

  If the heart rate exceeds 110 beats per minute at the beginning of the rest period shorten the next work cycle by one-third and keep the rest period the same.

  If the heart rate still exceeds 110 beats per minute at the next rest period shorten the following work cycle by one-third [12]

- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking)

  If oral temperature exceeds 99 6°F (37 6°C) shorten the next work cycle by one-third without changing the rest period

  If oral temperature still exceeds 99 6°F (37 6°C) at the beginning of the next rest period shorten the following work cycle by one-third [12]

  Do *not* permit a worker to wear a semipermeable or impermeable garment when his/her oral temperature exceeds 100 6°F (38 1°C)[12]

- Body water loss, if possible. Measure weight on a scale accurate to ±0 25 lb at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration Weights should be taken while the employee wears similar clothing or ideally, is nude *The body water loss should not exceed 1 5 percent total body weight loss in a work day* [12]

Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work (see Table 8-10) The length of the work cycle will be governed by the frequency of the required physiological monitoring

Prevention

Proper training and preventive measures will help avert serious illness and loss of work productivity Preventing heat stress is particularly important because once someone suffers from heat stroke or heat exhaustion that person may be predisposed to additional heat injuries To avoid heat stress management should take the following steps

- Adjust work schedules

  Modify work/rest schedules according to monitoring requirements

  Mandate work slowdowns as needed

  Rotate personnel alternate job functions to minimize overstress or overexertion at one task

  Add additional personnel to work teams

  Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided

- Provide shelter (air conditioned if possible) or shaded areas to protect personnel during rest periods

- Maintain workers' body fluids at normal levels This is necessary to ensure that the cardiovascular system functions adequately Daily fluid intake must approximately equal the amount of water lost in sweat, i e., 8 fluid ounces (0 23 liters) of water must be ingested for approximately every 8 ounces (0 23 kg) of weight lost The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat [14] When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful

  Maintain water temperature at 50° to 60°F (10° to 15 6°C)

  Provide small disposable cups that hold about 4 ounces (0 1 liter)

  Have workers drink 16 ounces (0 5 liters) of fluid (preferably water or dilute drinks) before beginning work

  Urge workers to drink a cup or two every 15 to 20 minutes or at each monitoring break A total of 1 to 1 6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight

  Weigh workers before and after work to determine if fluid replacement is adequate

- Encourage workers to maintain an optimal level of physical fitness

  Where indicated acclimatize workers to site work conditions temperature protective clothing and workload (see *Level of Acclimatization* at the end of this chapter)

  Urge workers to maintain normal weight levels

- Provide cooling devices to aid natural body heat exchange during prolonged work or severe heat exposure Cooling devices include

  Field showers or hose down areas to reduce body temperature and/or to cool off protective clothing

  Cooling jackets vests or suits (see Table 8-5 for details)

- Train workers to recognize and treat heat stress As part of training identify the signs and symptoms of heat stress (see Table 8 11)

Other Factors

PPE decreases worker performance as compared to an unequipped individual The magnitude of this effect varies considerably depending on both the individual and the PPE ensemble used This section discusses the demonstrated physiological responses to PPE the individual human characteristics that play a factor in these

[1]Although no protective ensemble is completely impermeable for practical purposes an outfit may be considered impermeable when calculating heat stress risk

Table 8-10 Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers[a]

ADJUSTED TEMPERATURE[b]	NORMAL WORK ENSEMBLE[c]	IMPERMEABLE ENSEMBLE
90°F (32 2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87 5° - 90°F (30 8° - 32 2°C)	After each 60 minutes of work	After each 30 minutes of work
82 5° - 87 5°F (28 1° - 30 8°C)	After each 90 minutes of work	After each 60 minutes of work
77 5° - 82 5°F (25 3° - 28 1°C)	After each 120 minutes of work	After each 90 minutes of work
72 5° - 77 5°F (22 5° - 25 3°C)	After each 150 minutes of work	After each 120 minutes of work

Source Reference [13]

[a]For work levels of 250 kilocalories/hour

[b]Calculate the adjusted air temperature (ta adj) by using this equation ta adj °F = ta °F + (13 × % sunshine) Measure air temperature (ta) with a standard mercury-in-glass thermometer with the bulb shielded from radiant heat Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow (100 percent sunshine = no cloud cover and a sharp distinct shadow 0 percent sunshine = no shadows)

[c]A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants

Table 8-11 Signs and Symptoms of Heat Stress[a]

- Heat rash may result from continuous exposure to heat or humid air
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement Signs and symptoms include
  - muscle spasms
  - pain in the hands feet and abdomen
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration Signs and symptoms include
  - pale cool moist skin
  - heavy sweating
  - dizziness
  - nausea
  - fainting
- Heat stroke is the most serious form of heat stress Temperature regulation fails and the body temperature rises to critical levels Immediate action must be taken to cool the body before serious injury and death occur Competent medical help must be obtained Signs and symptoms are
  - red hot usually dry skin
  - lack of or reduced perspiration
  - nausea
  - dizziness and confusion
  - strong rapid pulse
  - coma

[a]Source Reference [6]

responses and some of the precautionary and training measures that need to be taken to avoid PPE induced injury

The physiological factors may affect worker ability to function using PPE include

- Physical condition
- Level of acclimatization
- Age.
- Gender
- Weight

Physical Condition

Physical fitness is a major factor influencing a person s ability to perform work under heat stress The more fit someone is the more work they can safely perform At a given level of work a fit person relative to an unfit person will have [5 8 15 16]

- Less physiological strain
- A lower heart rate
- A lower body temperature which indicates less retained body heat (a rise in internal temperature precipitates heat injury)
- A more efficient sweating mechanism
- Slightly lower oxygen consumption
- Slightly lower carbon dioxide production

Level of Acclimatization

The degree to which a worker s body has physiologically adjusted or acclimatized to working under hot conditions affects his or her ability to do work Acclimatized individuals generally have lower heart rates and body temperatures than unacclimatized individuals [17] and sweat sooner and more profusely This enables them to maintain lower skin and body temperatures at a given level of environmental heat and work loads than unacclimatized workers [18] Sweat composition also becomes more dilute with acclimatization which reduces salt loss [8]

Acclimatization can occur after just a few days of exposure to a hot environment [15 16] NIOSH recommends a progressive 6-day acclimatization period for the unacclimatized worker before allowing him/her to do full work on a hot job [16] Under this regimen the first day of work on site is begun using only 50 percent of the anticipated workload and exposure time, and 10 percent is added each day through day 6 [16] With fit or trained individuals, the acclimatization period may be shortened 2 or 3 days However workers can lose acclimitization in a matter of days, and work regimens should be adjusted to account for this

When enclosed in an impermeable suit, fit acclimatized individuals sweat more profusely than unfit or unacclimatized individuals and may therefore actually face a greater danger of heat exhaustion due to rapid dehydration This can be prevented by consuming adequate quantities of water See previous section on *Prevention* for additional information

Age

Generally maximum work capacity declines with increasing age, but this is not always the case. Active, well-conditioned seniors often have performance capabilities equal to or greater than young sedentary individuals However there is some evidence, indicated by lower sweat rates and higher body core temperatures that older individuals are less effective in compensating for a given level of environmental heat and work loads [19] At moderate thermal loads, however, the physiological responses of "young" and "old" are similar and performance is not affected [19]

Age should not be the sole criterion for judging whether or not an individual should be subjected to moderate heat stress Fitness level is a more important factor

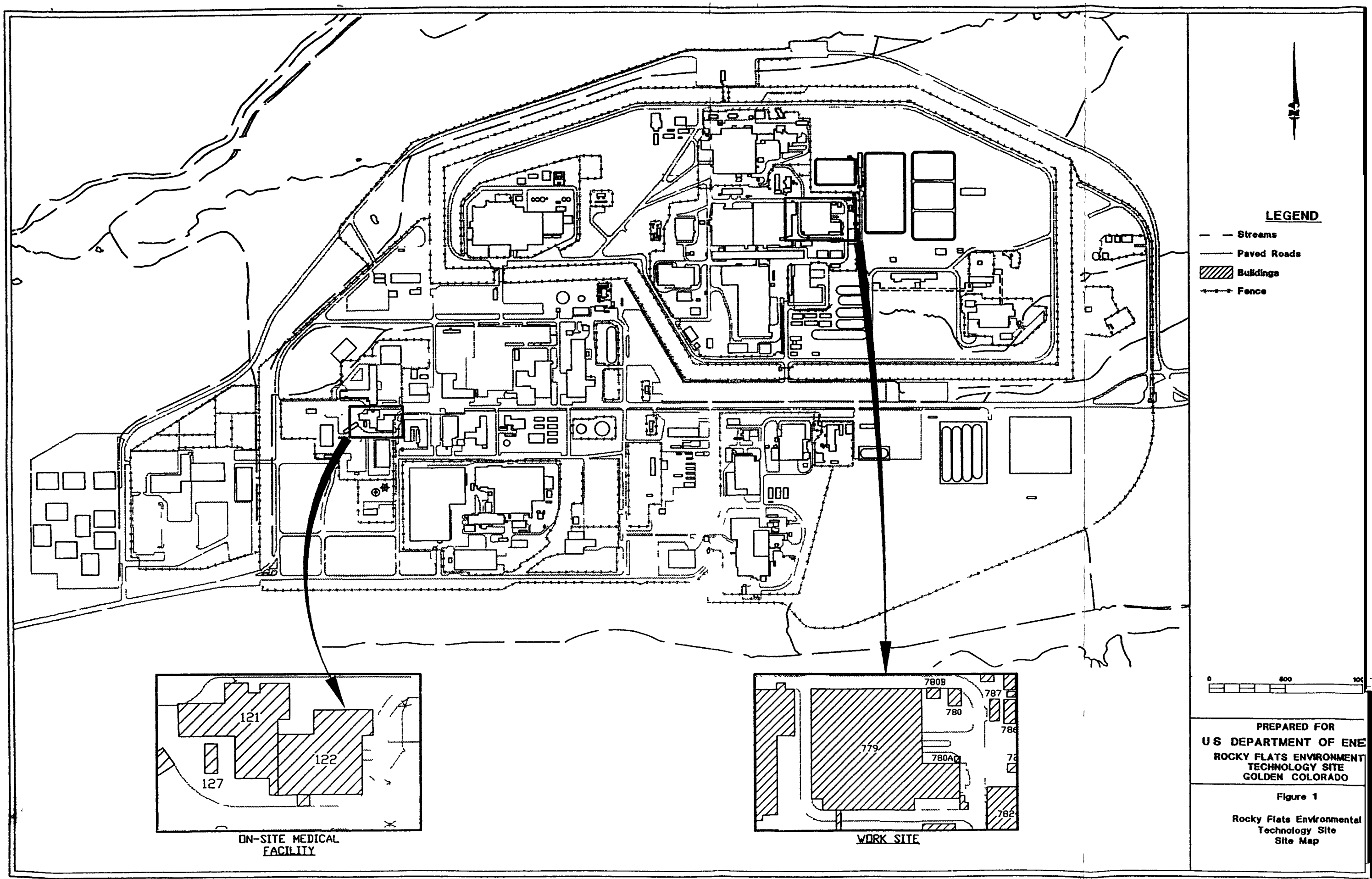
Gender

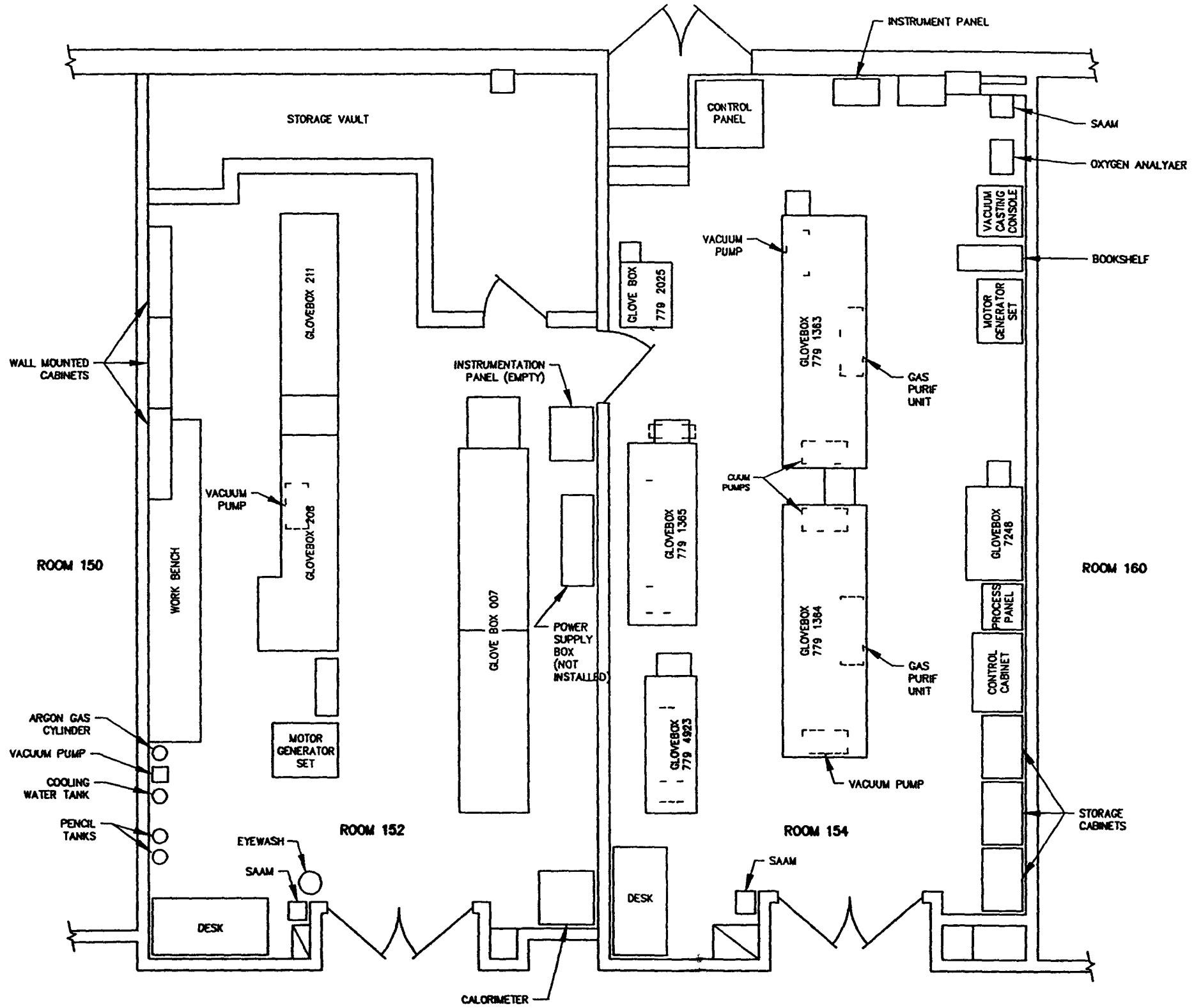
The literature indicates that females tolerate heat stress at least as well as their male counterparts [20] Generally a female s work capacity averages 10 to 30 percent less than that of a male [8] The primary reasons for this are the greater oxygen-carrying capacity and the stronger heart in the male [15] However a similar situation exists as with aging not all males have greater work capacities than all females

Weight

The ability of a body to dissipate heat depends on the ratio of its surface area to its mass (surface area/weight) Heat loss (dissipation) is a function of surface area and heat production is dependent on mass Therefore heat balance is described by the ratio of the two

Since overweight individuals (those with a low ratio) produce more heat per unit of surface area than thin individuals (those with a high ratio), overweight individuals should be given special consideration in heat stress situations However when wearing impermeable clothing the weight of an individual is not a critical factor in determining the ability to dissipate excess heat


N
LEGEND
Streams
Paved Roads
Buildings
Fence
0
800
121
122
127
ON-SITE MEDICAL FACILITY
780B
787
780
786
779
780A
782
WORK SITE
PREPARED FOR
U S DEPARTMENT OF ENE
ROCKY FLATS ENVIRONMENT TECHNOLOGY SITE
GOLDEN COLORADO
Figure 1
Rocky Flats Environmental Technology Site
Site Map



PLAN – ROOM 152 AND ROOM 154

SCALE: 3/16 = 1-0

FIGURE 2

**LAYOUT PLAN
ROOMS 152 AND 154
BUILDING 779**

Rocky Flats Environmental
Technology Site
Golden Colorado

ENGINEERING-SCIENCE, INC
Denver Colorado

94DN0966 8/29/94 at 8 30